

# Y-12

## OAK RIDGE Y-12 PLANT

**MARTIN MARIETTA**

INVENTORY OF DISPOSALS  
CONDUCTED IN  
THE CHESTNUT RIDGE SECURITY PIT

February 1973 through March 1984

Production Optimization Department

July 13, 1984\*

\*Work performed prior to April 1, 1984, by Union Carbide Corporation Nuclear Division for the U.S. Department of Energy under Contract W-7405-eng-26.

MANAGED BY  
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FOR THE UNITED STATES  
DEPARTMENT OF ENERGY

#459

## INTRODUCTION

This report is being issued to provide an unclassified inventory of the Chestnut Ridge Security Pit (also known as the Polecat Ridge Security Pit or Security Pit #2). This report was not requested in the May 26, 1983, Memorandum of Understanding (MOU) between the Department of Energy, Environmental Protection Agency, and the Tennessee Department of Health and Environment, but was requested in the September 15, 1983, Complaint and Order by James E. Word, Commissioner, Tennessee Department of Health and Environment. To satisfy the Complaint and Order, the Y-12 Plant issued unclassified document Y/DS-166, Revision 2, "Preliminary Chestnut Ridge Security Pit Inventory," September 28, 1983. Since document Y/DS-166, Revision 2, was preliminary, this document, Y/DS-191, provides a final report.

Disposals described in this report are current through March 1984.

## HIGHLIGHTS

- The Chestnut Ridge Security Pit is located south of the main Y-12 Plant on the hill behind Buildings 9201-1 and 9204-1 inside a single security fence.
- Use of this security pit for classified disposals started in February 1973. Disposals are continuing today.
- Materials buried are predominantly uranium and uranium alloys, ferrous materials, thorium, and debris.
- Total quantity buried is approximately 4000 tons.

## HISTORY

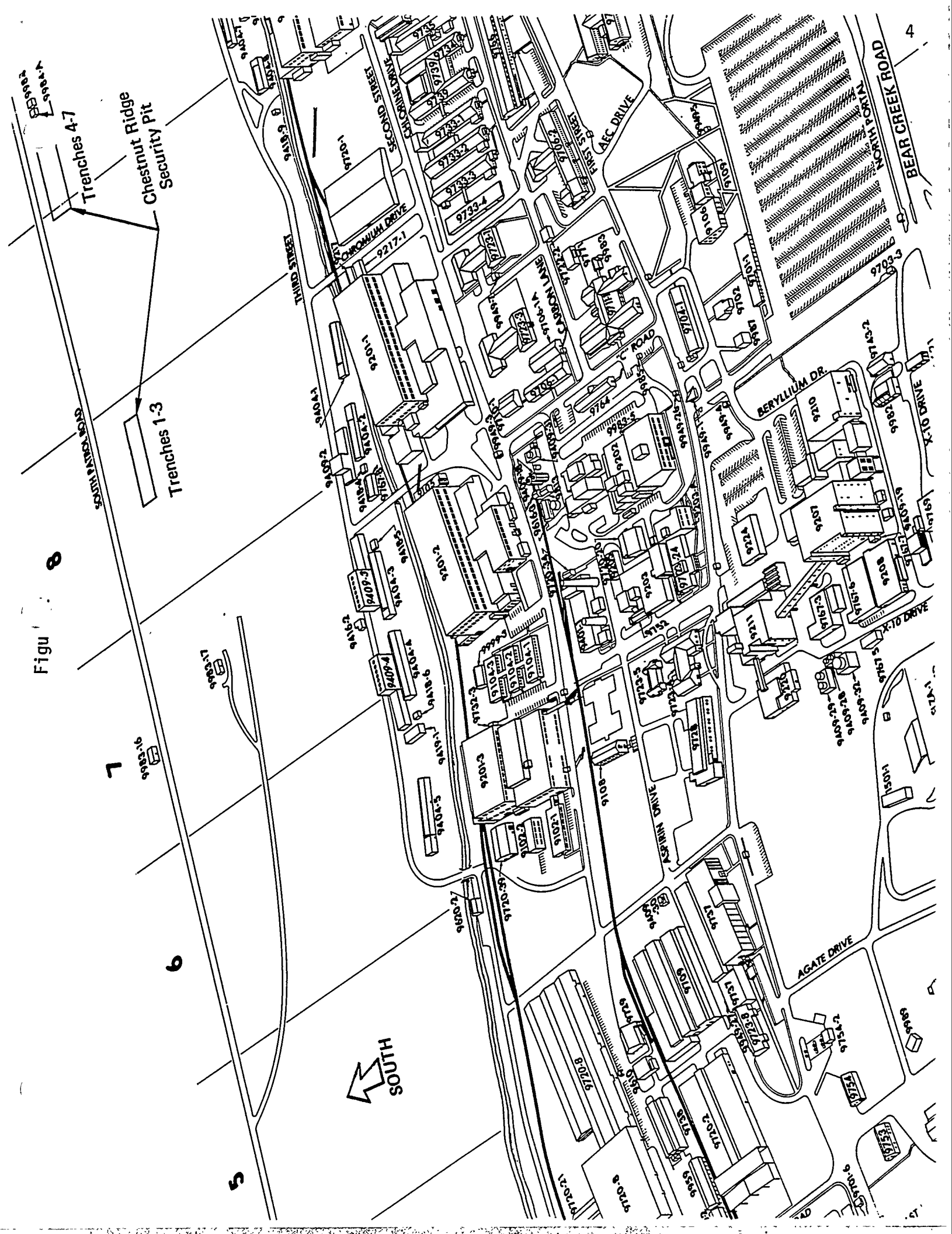
The Chestnut Ridge Security Pit area is the third below-ground disposal area within the Y-12 Plant used for burial of classified items. The first two areas were the Coal-Pile Security Pit west of the 9401-3 Steam Plant and the Beta-4 Security Pit northwest of Building 9204-4. Disposals to these two sites were reported in unclassified document Y/DS-164, Revision 2, "Coal-Pile Burial During 1965/1966," December 21, 1983; and in unclassified document Y/DS-180, "Beta-4 Security Pit Documented Disposals Inventory," April 11, 1984.

By 1972 available space at the Beta-4 Security Pit was becoming filled, so the Y-12 Plant requested permission from the then-Atomic Energy Commission (AEC) to open a new security pit area on Chestnut Ridge. This permission was granted in a letter from H. D. Hickman to J. M. Case, "Classified Burial Ground," August 17, 1972.

## BACKGROUND

The Chestnut Ridge Security Pit is located south of the main Y-12 Plant on a hill behind Buildings 9201-1 and 9204-1. The security pit consists of trenches in two separate areas as shown on Figure 1 (page 4). Figures 2

Figure 8



through 5 (pages 6 through 9) are photographs of the areas as they appeared in September 1983.

The eastern area has three separate disposal trenches that have been filled and are inactive; some minor landscaping is incomplete. These three inactive trenches were designated as numbers 1, 2, and 3 for disposal purposes. The western area has two active trenches in use today. These two active trenches are designated as 5E and 5W. The current design for the western area shows that trenches 5E and 5W will eventually become a single trench, number 5, and that trenches 4, 6, and 7 can be added.

For the inactive trenches in the eastern area, trench number 1 was approximately 700 feet long and active from February 1973 through December 1977. Trench number 2 was approximately 720 feet long and active from December 1977 through January 1981. Trench number 3 was approximately 690 feet long and active from January 1981 through December 1982. All three trenches were approximately 8 to 10 feet wide and 10 to 12 feet deep. Each trench was discontinuous in length by approximately 18 feet because of the existence of an underground cable lying transverse to the trench lengths. Associated with these three trenches are six auger holes, each approximately 2 feet in diameter x 10 feet deep. Two of these are still active. The auger holes are used for disposal of particularly reactive materials. Most disposals have consisted of powder mixtures. A detailed layout of the eastern area of the Chestnut Ridge Security Pit is available on Y-12 Plant sketch D-1116.

In the active western area, trenches 5E and 5W are also approximately 8 to 10 feet wide and 10 to 12 feet deep. They have been in use since December 1982.

Material has not been indiscriminately dumped and buried in the trenches. The trenches have been segregated such that similar materials are generally buried in the same location over a long period of time. In the currently active trenches, 5E and 5W, depleted uranium materials are being buried in 5E and non-uranium materials such as steel and aluminum are being buried in 5W. In inactive trenches 1, 2, and 3, at least 16 distinct areas, each for a specific material category, were used.

The method used to fill the various trenches in the Chestnut Ridge Security Pit is based on a section of the trench in use being excavated when needed. Each excavation is usually about 30 feet long. As disposals are required, classified loads are carried by truck to the trench excavations and dumped. The classified debris is covered that day with 6 to 12 inches of fill dirt that was originally dug up when the section was excavated. Alternating layers of classified waste and covering dirt are built up over a period of weeks, or months, until the section is almost full. At this point, 3 to 6 feet of fill dirt are used to close the section and level it with the ground. A new section is then excavated and the old section is seeded. No special preparation or techniques are used in an attempt to prevent trench leakage. The soil in both plots, which was categorized by analysis prior to opening, has a clay-like composition to the depth of the trenches. A monitoring well is in operation adjacent to the Chestnut Ridge Security Pit area. Water samples are collected and analyzed quarterly. The Chestnut Ridge Security Pit

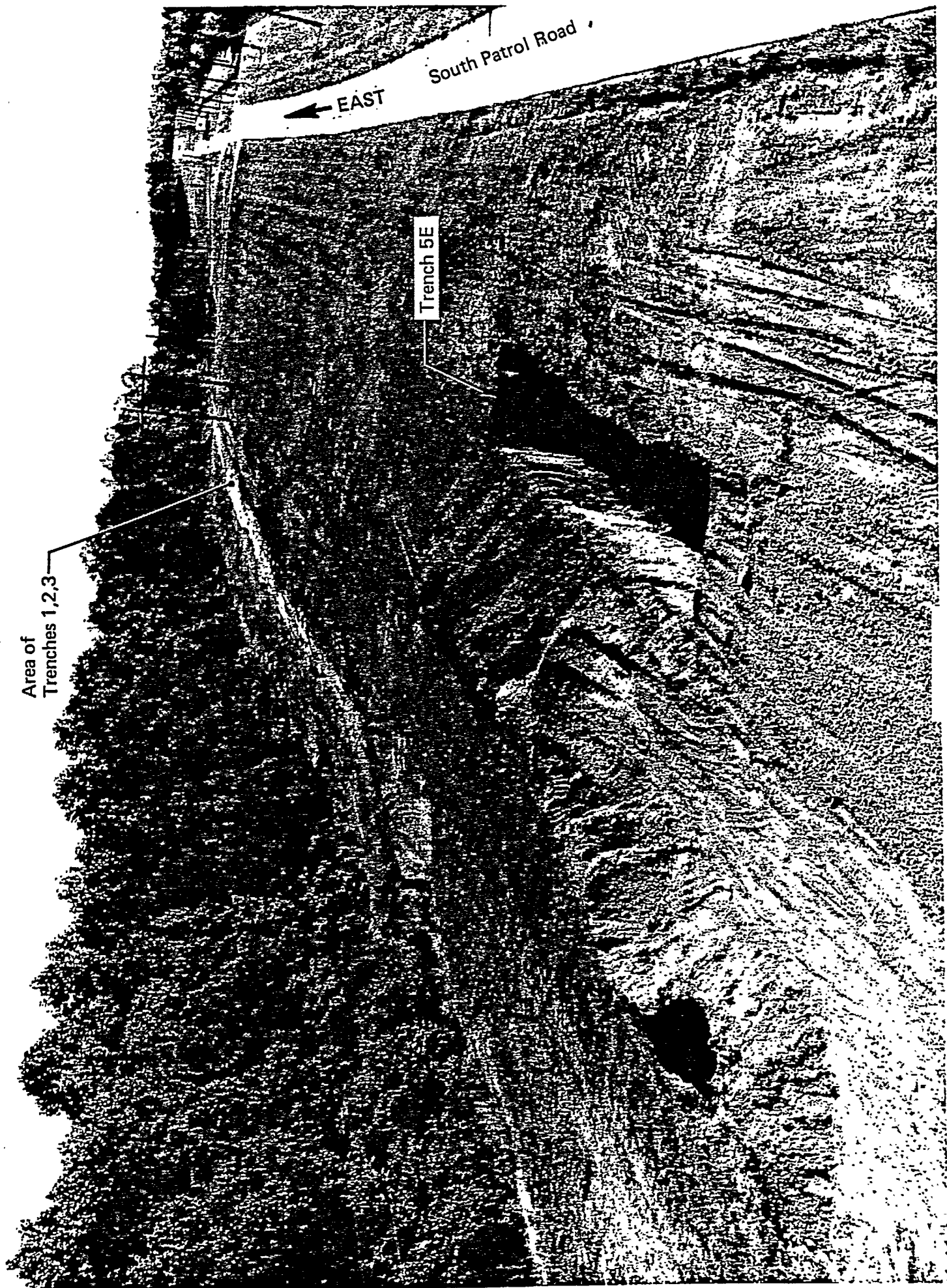


Figure 2

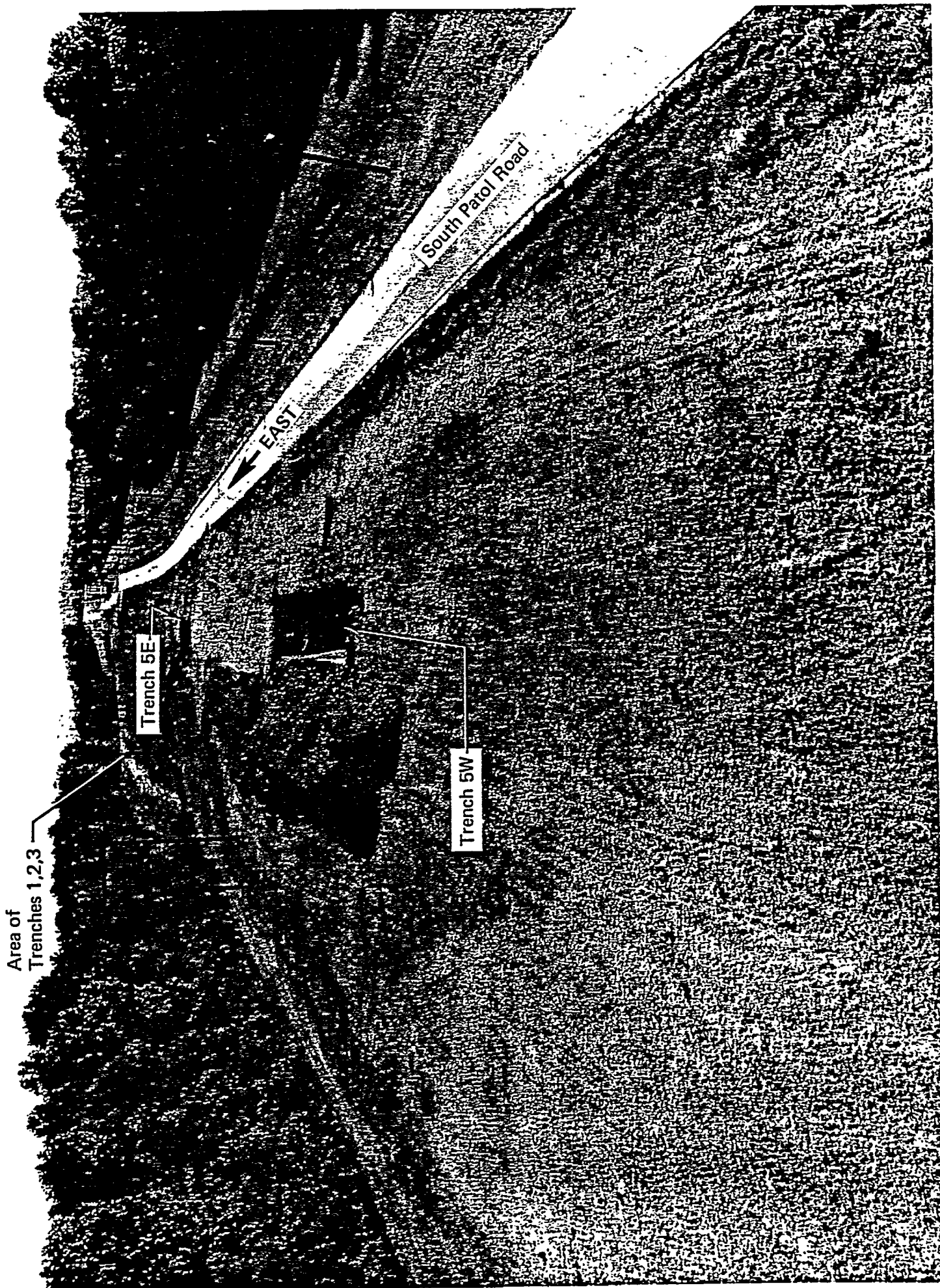


Figure 3

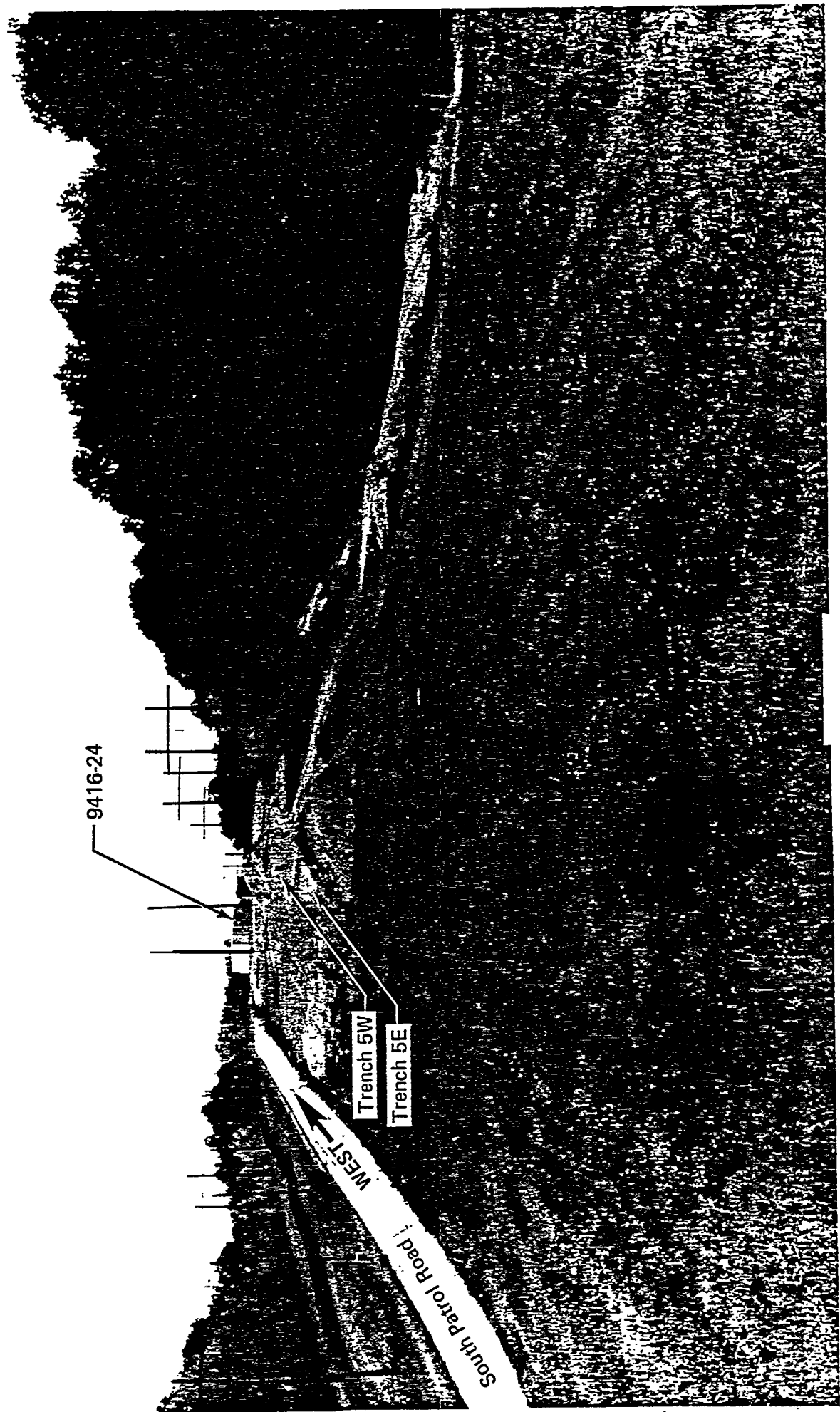


Figure 4

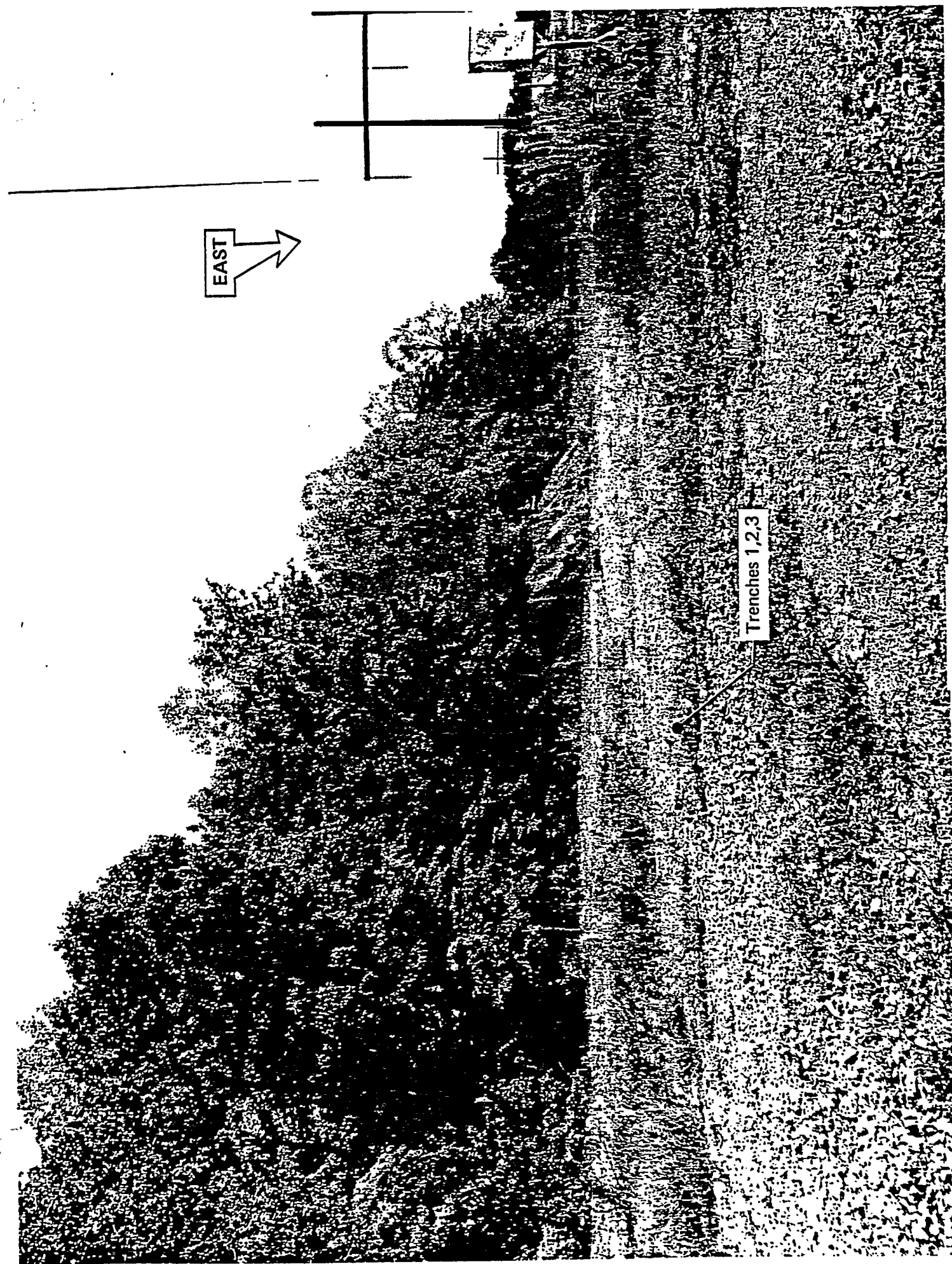


Figure 5

area will be included in a study to be performed by an outside contractor to determine the need for and placement of additional monitoring wells.

## RECORDS

Records from the Y-12 Plant Maintenance Division provided most of the quantitative source data and the material descriptions reported herein. These records are:

1. "Trip Log of Unserviceable Material and Equipment" (UCN-2418)
2. "Request for Disposal of Hazardous Chemicals, Gases and Radioactive Materials" (UCN-2109)
3. "Request for Disposal of Classified Equipment and Materials" (UCN-6538)
4. A Kardex File showing "Blanket" (routine) disposals
5. Maintenance Division Monthly Activity Reports
6. Maintenance Division Monthly Disposal Summaries
7. Maintenance Division Classified Disposal Summaries

Records 1, 4, 5, 6, and 7 were initiated and completed within the Maintenance Division. Records 2 and 3 were initiated and partially completed by the requesting areas within the Y-12 Plant and completed by the Maintenance Division.

All available UCN-2109s and UCN-6538s through August 1983, the Kardex File, and the Classified Disposal Summaries, irrespective of indicated disposal site, were transcribed into a computer data base. The UCN-2418s were statistically sampled. The sampling technique was reported in a letter from G. G. Fee to H. D. Hickman, "Statistical Methods Used During the inventorying of Y-12 Plant Burial Grounds," September 2, 1983. Altogether, records of over 100,000 disposals were examined and computerized, of which approximately 3900 were applicable to the Chestnut Ridge Security Pit. The remaining records were used in preparation of other reports.

## TYPE OF MATERIALS

At least the following materials are buried in the Chestnut Ridge Security Pit:

- |                                                    |              |                     |
|----------------------------------------------------|--------------|---------------------|
| 1. Depleted Uranium and<br>Depleted Uranium Alloys | 5. Magnesium | 12. Zirconium       |
| 2. Depleted Uranium-<br>contaminated Debris        | 6. Steel     | 13. Alcohol         |
| 3. Thorium-contaminated<br>Debris                  | 7. Aluminum  | 14. Thoria          |
| 4. Polyvinyl Chloride                              | 8. Thorium   | 15. Polycarbonate   |
|                                                    | 9. Arsenic   | 16. Computer Discs  |
|                                                    | 10. Plastic  | 17. Honeycomb       |
|                                                    | 11. Lead     | 18. Lithium Hydride |

|                                          |             |                        |
|------------------------------------------|-------------|------------------------|
| 19. Beryllium                            | 27. Foam    | 37. Aqueous Solutions  |
| 20. Classified Materials                 | 28. Carbon  | 38. Tantalum           |
| 21. Beryllium-contaminated Debris        | 29. Kevlar  | 39. Lithium Deuteride  |
| 22. Beryllium Oxide                      | 30. Badges  | 40. Polyurethane       |
| 23. Enriched Uranium-contaminated Debris | 31. Copper  | 41. Tungsten Alloy     |
| 24. Organic Ammonium Compounds           | 32. Brass   | 42. Polystyrene        |
| 25. 1,1,1 Trichloroethane                | 33. Nickel  | 43. Typewriter Ribbons |
| 26. Titanium                             | 34. Epoxies | 44. Enriched Uranium   |
|                                          | 35. Micarta | 45. Video Tapes        |
|                                          | 36. Wood    | 46. Silicone Rubber    |

Some disposals of these materials have origins other than the Y-12 Plant. The responsible outside organizations, material descriptions, and weights are shown in Table 1 (page 12). The greatest amount, 401,139 pounds (201 tons), came from the Bendix Corporation, Kansas City, Missouri.

The preponderance of the Y-12 Plant-generated waste is in the form of solid metal components--machining fixtures, formed or machined weapons parts, gages, shipping containers, etc. Much of the debris consists of solids such as contaminated gloves, bottles, and bags; badges; computer tapes; etc. Lesser amounts of materials are in the form of powders such as lithium hydride, beryllium oxide, etc. Disposals of liquids such as dilute hydrochloric acid, mineral oil, alcohol, etc., represent a very small amount.

All materials buried in the Chestnut Ridge Security Pit have been categorized into 11 major categories, which are consistent with those categories reported in SRD document Y/DS-174, "Bear Creek Burial Ground Documented Disposal Inventory (U)," January 31, 1984. The 11 major categories are:

|                |                 |             |
|----------------|-----------------|-------------|
| 1. Acids       | 5. Debris       | 9. Thorium  |
| 2. Fiberglas   | 6. Heavy Metals | 10. Unknown |
| 3. Beryllium   | 7. Inorganics   | 11. Uranium |
| 4. Biologicals | 8. Organics     |             |

These categories, with associated subcategories, are shown in Table 2 (page 13).

#### QUANTITY OF MATERIALS

Quantitative data used in this report were taken from five record sources:

1. Statistical Sample (1973-1979)
2. Kardex File (1973-1979)
3. Classified Disposal Summaries (1980-1984)
4. Monthly Disposal Summaries (1973-1984)
5. Activity Reports (1973-1984)

The Statistical Sample and the Kardex File share the same origin--the "Trip Log[s] of Unserviceable Material and Equipment" (UCN-2418). The use of UCN-2418s was discontinued in March 1980 and replaced by the Classified Disposal

Table 1

## CLASSIFIED DISPOSALS FROM OUTSIDE ORGANIZATIONS

| Material Description                                       | From              | Amount             | Disposal Date |
|------------------------------------------------------------|-------------------|--------------------|---------------|
| Waste                                                      | Bendix            | 151,680 lb         | 03/??/73      |
| Waste                                                      | Bendix            | 56,172 lb          | 06/??/73      |
| Waste                                                      | Battelle Memorial | 1 drum             | 08/28/73      |
| Waste                                                      | Bendix            | 55,300 lb          | 12/??/73      |
| Waste                                                      | Bendix            | 38,240 lb          | 05/??/74      |
| Waste                                                      | Bendix            | 52,720 lb          | 10/??/74      |
| Reactor Components                                         | Knolls Lab        | 13,625 lb          | 10/27/77      |
| Enriched Uranium-contaminated Shapes                       | Bettis Lab        | 5,704 lb           | 11/08/77      |
| Cylinders Containing Contaminated Gas                      | Mound Lab         | -                  | 03/28/78      |
| Waste                                                      | Bendix            | 4,000 lb           | 12/??/78      |
| Dep. & Enr. Uranium Oxides                                 | Knolls Lab        | 591 lb             | 06/28/79      |
| Zircaloy Parts                                             | Bettis Lab        | 950 lb             | 08/14/80      |
| Dep. & Enr. U Oxides & Th Oxide                            | Knolls Lab        | 235 lb             | 09/09/80      |
| Steel Parts                                                | Battelle Memorial | 500 lb             | 12/19/80      |
| Zircaloy Parts                                             | Knolls Lab        | 584 lb             | 02/19/81      |
| Waste                                                      | 3M                | 2,350 lb           | 04/14/81      |
| Waste                                                      | 3M                | 12,000 lb          | 04/29/81      |
| Waste                                                      | Bendix            | 43,027 lb          | 09/??/81      |
| Uranium-contaminated Waste                                 | Bettis Lab        | 3,400 lb           | 09/17/81      |
| Waste                                                      | Woven Structures  | 1,500 lb           | 11/06/81      |
| Waste                                                      | 3M                | 7,700 lb           | 11/06/81      |
| Waste                                                      | Bettis Lab        | 2,764 lb           | 11/06/81      |
| Waste                                                      | 3M                | 8,986 lb           | 04/15/82      |
| Aluminum and Steel Parts                                   | Rockwell          | 11,914 lb          | 05/24/83      |
| Waste                                                      | 3M                | 20,000 lb          | 06/02/83      |
| Total (excluding two entries without quantity information) |                   | 493,942 (247 tons) |               |

Table 2  
MATERIAL GROUPS

| Major Groups | Subgroups                                                                                                                     | Additional Subgroups             |
|--------------|-------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| Acids        | Inorganic Acid                                                                                                                |                                  |
| Fiberglas    | Fiberglas                                                                                                                     |                                  |
| Beryllium    | Beryllium<br>Beryllium-contaminated                                                                                           |                                  |
| Biological   | Biological                                                                                                                    |                                  |
| Debris       | Debris                                                                                                                        |                                  |
| Heavy Metals | Arsenic<br>Lead                                                                                                               |                                  |
| Inorganics   | Alkaline Metal<br>Ammonium Radical<br>Carbon<br>Copper<br>Ferrous<br>Other Inorganic<br>Rare Earth<br>Refractory Metal<br>Tin |                                  |
| Organics     | Aliphatic                                                                                                                     | Alcohol<br>Aliphatic Hydrocarbon |
| Organics     | Cyclic                                                                                                                        | Aromatic Hydrocarbon             |
| Organics     | Synthetic High Polymer                                                                                                        |                                  |
| Organics     | Oil                                                                                                                           | Petroleum Oil                    |
| Organics     | Other                                                                                                                         | Unknown Organic                  |
| Thorium      | Thorium<br>Thorium-contaminated                                                                                               |                                  |
| Unknown      | Unknown                                                                                                                       |                                  |
| Uranium      | Uranium<br>Depleted Uranium-contaminated<br>Enriched Uranium-contaminated                                                     |                                  |

Summaries. The Monthly Disposal Summaries show gross totals developed from the first three sources. Two of the other record sources mentioned earlier--The "Request[s] for Disposal of Hazardous Chemicals, Gases and Radioactive Materials" (UCN-2109) and the "Request[s] for Disposal of Classified Equipment and Materials" (UCN-6538) tended to provide better material descriptions than the UCN-2418s but generally lacked good quantitative information. However, quantitative data for the UCN-2109 and UCN-6538 disposals were shown on the UCN-2418s and, thus, statistically sampled, and from March 1980, were included in the Classified Disposal Summaries.

Data developed from the Statistical Sample, from the Kardex File, and from the Classified Disposal Summaries were categorized by material, while data in the Maintenance Division Monthly Disposal Summaries show gross totals to particular disposal sites without regard to material type.

Table 3 (page 15) shows the combined data from the Statistical Sample, from the Kardex File, from the Classified Disposal Summaries, and from the Activity Reports. This combined sum represents the total disposal quantity. Table 4 (page 16) shows the gross totals from the Monthly Disposal Summaries. The total tonnage agreement between Tables 3 and 4, 3956 tons and 3511 tons, respectively, appears statistically reasonable.

Of the estimated tonnage to the Chestnut Ridge Security Pit, uranium represents approximately 1740 tons (44%), ferrous materials represent approximately 501 tons (13%), thorium represents approximately 444 tons (11%), debris represents approximately 390 tons (10%), and other inorganics--aluminum, magnesium, titanium, etc.--represent approximately 383 tons (10%). Approximately 156 tons (4%) are in the unknown category. All the remaining categories represent approximately 343 tons (9%).

Of the 3900 entries in Table 3 (page 15), 128 (3.3%) lack quantity information. Because of the good agreement between the two tonnage numbers mentioned earlier and because of our involvement with the disposal records, the tonnage represented for these 128 entries is estimated to be small.

Table 3

## TOTAL DISPOSAL QUANTITIES TO CHESTNUT RIDGE SECURITY PIT

Quantitative Data Derived from  
the Statistical Sample, the Kardex File,  
the Classified Disposal Summaries, and the Activity Reports

|                               | Total Number<br>of Entries | Total Estimated<br>Quantity<br>(tons) |
|-------------------------------|----------------------------|---------------------------------------|
| Alcohol                       | 2                          |                                       |
| Aliphatic Hydrocarbon         | 5                          | 2.20                                  |
| Alkaline Metal                | 62                         | 0.84                                  |
| Ammonium Radical              | 210                        | 29.81                                 |
| Aromatic Hydrocarbon          | 5                          |                                       |
| Arsenic                       | 1                          |                                       |
| Beryllium                     | 106                        | 57.73                                 |
| Beryllium-contaminated        | 12                         |                                       |
| Biological                    | 12                         | 2.35                                  |
| Carbon                        | 56                         | 15.65                                 |
| Copper                        | 14                         |                                       |
| Debris                        | 891                        | 389.65                                |
| Depleted Uranium-contaminated | 35                         |                                       |
| Enriched Uranium-contaminated | 7                          |                                       |
| Ferrous                       | 572                        | 501.23                                |
| Fiberglas                     | 1                          |                                       |
| Inorganic Acid                | 2                          |                                       |
| Lead                          | 11                         |                                       |
| Material from Bendix          | 21                         | 200.00                                |
| Other Inorganic               | 536                        | 382.50                                |
| Petroleum Oil                 | 3                          |                                       |
| Rare Earth                    | 1                          |                                       |
| Refractory Metal              | 13                         |                                       |
| Synthetic High Polymer        | 217                        | 34.30                                 |
| Thorium                       | 171                        | 444.02                                |
| Thorium-contaminated          | 14                         |                                       |
| Tin                           | 1                          |                                       |
| Unknown                       | 248                        | 155.86                                |
| Unknown Organic               | 4                          |                                       |
| Uranium                       | <u>667</u>                 | <u>1740.09</u>                        |
| Total                         | 3900                       | 3956.23                               |

Table 4  
TOTAL DISPOSAL QUANTITIES TO  
CHESTNUT RIDGE SECURITY PIT

Quantitative Data from  
the Maintenance Division  
Monthly Disposal Summaries

| Year  | Pounds                      |
|-------|-----------------------------|
| 1973  | 436,462 <sup>1</sup>        |
| 1974  | 321,271                     |
| 1975  | 465,361                     |
| 1976  | 394,682                     |
| 1977  | 557,566                     |
| 1978  | 897,119                     |
| 1979  | 385,223 <sup>1</sup>        |
| 1980  | 490,447                     |
| 1981  | 731,782                     |
| 1982  | 1,034,299 <sup>2</sup>      |
| 1983  | 1,169,978 <sup>1</sup>      |
| 1984  | <u>138,310<sup>3</sup></u>  |
| Total | 7,022,500<br>(3511.25 tons) |

1. Data for 1 of 12 reporting periods missing.
2. Data for 2 of 12 reporting periods missing.
3. Through February 1984.

## Distribution:

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